Lawns and Impacts on Water Quality

Urban Water Quality Workshop, JMU, November 1, 2011

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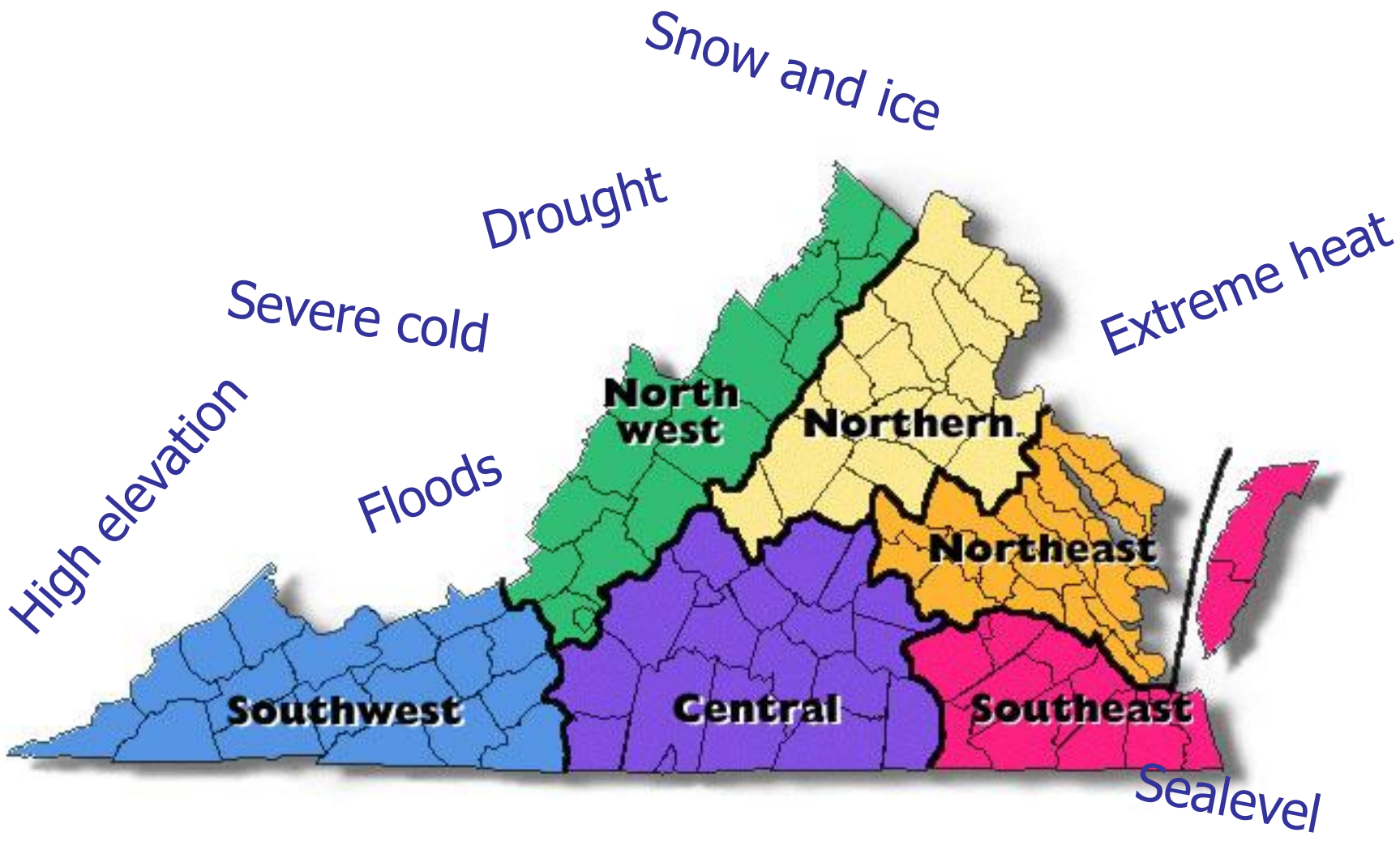
Crop and Soil Environmental Sciences Dept.

VirginiaTech
Invent the Future

Virginia is the southern-most state in the Chesapeake Bay Watershed. This presents its own, unique challenges.

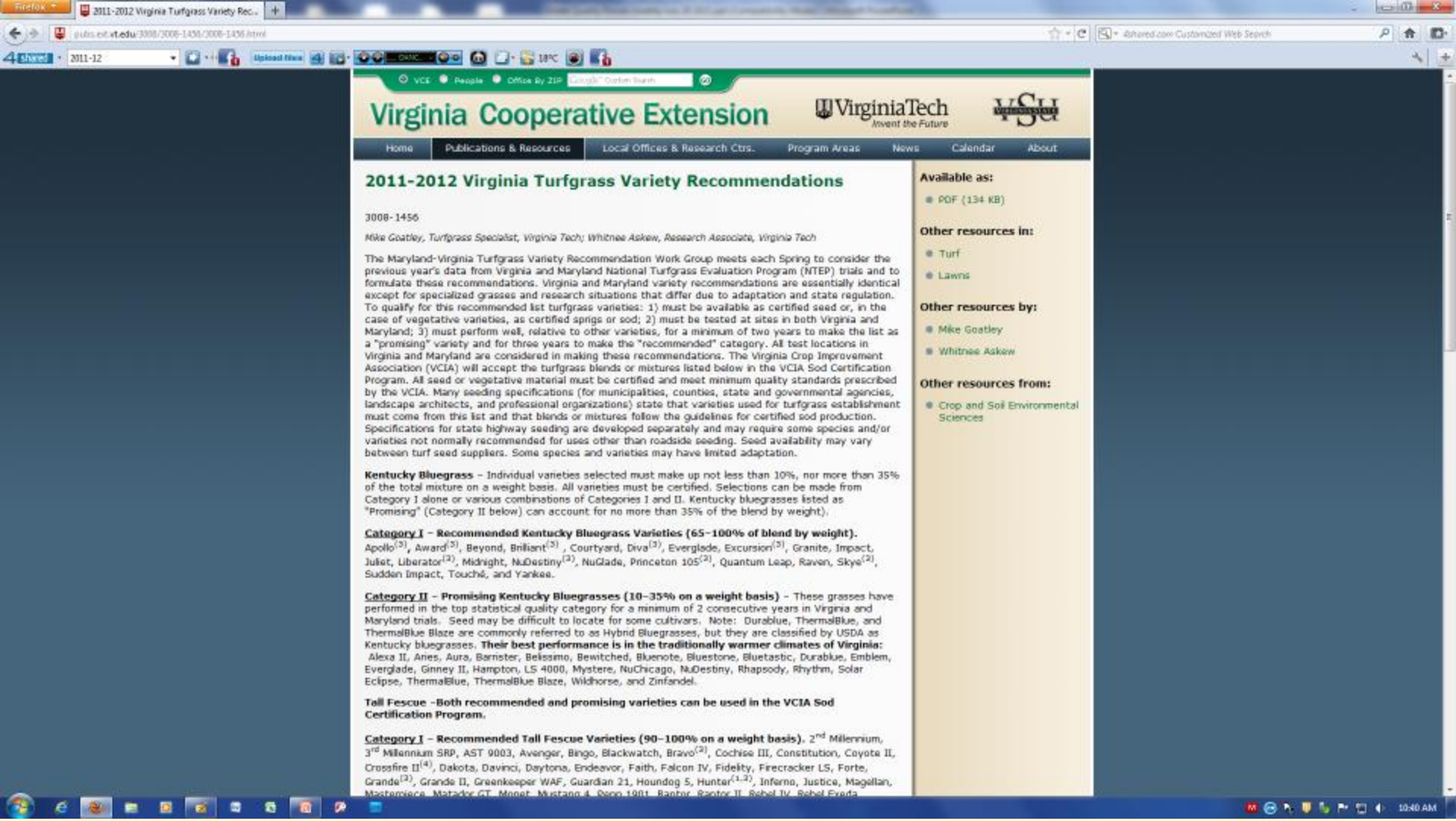
Turfgrasses Actually Protect the Environment if Managed the RIGHT Way

- **Right grass**
- Right time
- Right product
- Right place
- Right practice



Any such thing as a “perfect grass” in Virginia?

Put the grass' genetics to work for you. Want dark green color? Consult NTEP data for cultivars with genetically darker green color. Each of these Kentucky bluegrass cultivars receive the same seasonal N program.



Go to www.vt.edu and search for Turfgrass Variety Recommendations for assistance in selecting the RIGHT grass.

Choosing a grass for VA is like this doorbell… just because it works doesn't mean it's easy to use!

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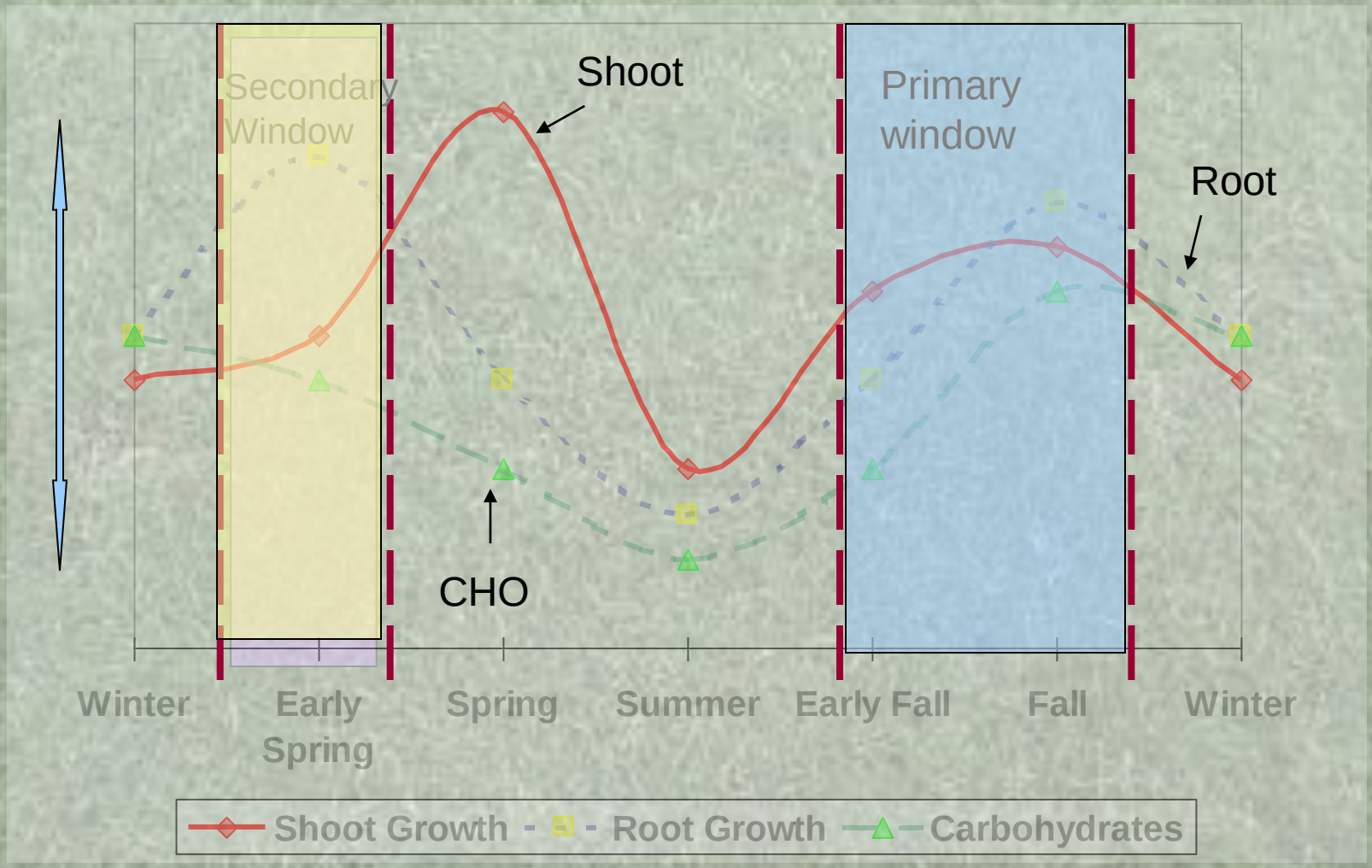
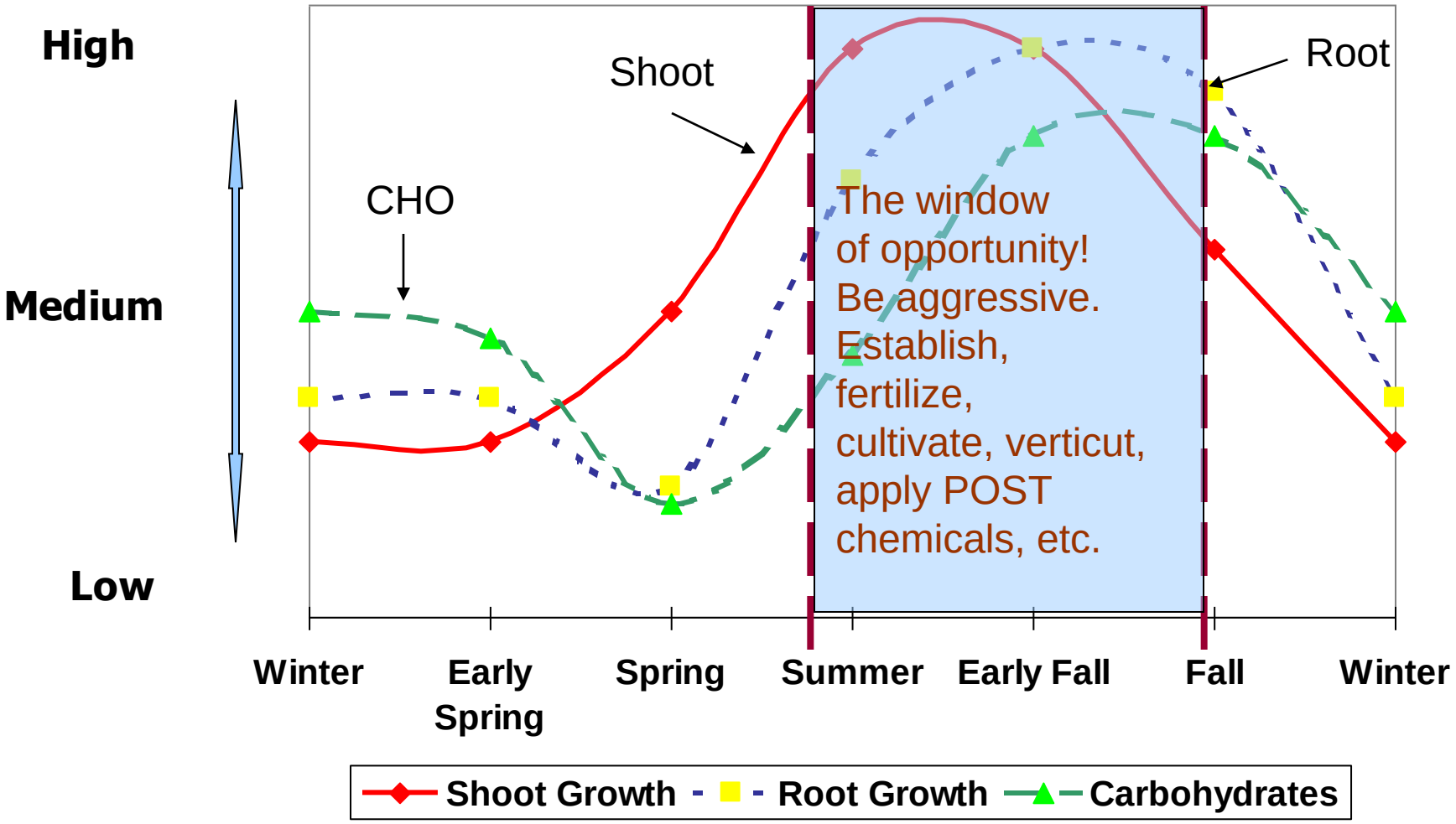
Seasonal Growth Patterns: Cool-Season Turfgrasses



Seasonal Growth Patterns: Warm-Season Turfgrasses



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Report Number:
R07135-0071
Account Number:
77643

A&L Eastern Laboratories, Inc.

7621 Whitepine Road Richmond, Virginia 23237 (804) 743-9401
Fax No. (804) 271-6446 Email: office@al-labs-eastern.com

Send To: VIRGINIA GREEN LAWN CARE
POB 8623
RICHMOND, VA 23226

Grower: VIRGINIA GREEN LAWN CARE

Submitted By: VIRGINIA GREEN LAWN CARE

Farm I D: **Field I D:**

SOIL ANALYSIS REPORT

Page: 1 **Date Received:** 5/15/2007 **Date of Analysis:** 5/16/2007 **Date of Report:** 5/17/2007

Analytical Method(s):
Mehlich III

Sample Number	Lab Number	Organic Matter %	Organic Matter ENR lbs/A	Organic Matter ENR Rate	Phosphorus Available ppm	Phosphorus Available Rate	Phosphorus Reserve ppm	Phosphorus Reserve Rate	Potassium K ppm	Potassium K Rate	Magnesium MG ppm	Magnesium MG Rate	Calcium CA ppm	Calcium CA Rate	Sodium NA ppm	Sodium NA Rate	pH Soil pH	pH Buffer Index	Acidity H meq/100g	C.E.C. meq/100g
2548	4138	4.5	128	M	10	VL			101	M	125	M	650	L			4.8	6.5	4.0	8.5
3961	4139	3.5	107	M	19	L			101	M	135	M	490	VL			4.5	6.4	5.3	9.1

Sample Number	Percent Base Saturation K %	Mg %	Ca %	Na %	H %	Nitrate NO3-N ppm	Nitrate Rate	Sulfur SO4-S ppm	Sulfur Rate	Zinc ZN ppm	Zinc Rate	Manganese MN ppm	Manganese Rate	Iron FE ppm	Iron Rate	Copper CU ppm	Copper Rate	Boron B ppm	Boron Rate	Soluble Salts ms/cm	Soluble Salts Rate	Chloride CL ppm	Chloride Rate	Aluminum AL ppm	Aluminum Rate
2548	3.0	12.2	38.2		46.6																				
3961	2.8	12.3	26.8		58.0																				

ALE-Soil

Values on this report represent the plant available nutrients in the soil.
Rating after each value: VL (Very Low), L (Low), M (Medium), H (High), VH (Very High).
ENR - Estimated Nitrogen Release. C.E.C. - Cation Exchange Capacity.

Explanation of symbols: % (percent), ppm (parts per million), lbs/A (pounds per acre), ms/cm (milli-mhos per centimeter), meq/100g (milli-equivalent per 100 grams).
Conversions: ppm x 2 = lbs/A, Soluble Salts ms/cm x 640 = ppm.

This report applies to the sample(s) tested. Samples are retained a maximum of thirty days after testing. Soil Analysis prepared by:
A & L EASTERN LABORATORIES, INC.

by: Paul Chu, Ph.D.

19-0-19

LESCO® PROFESSIONAL TURF FERTILIZER

For use in Rotary Spreaders Only

Contains LESCO® Poly Plus® Sulfur Coated Urea to provide uniform growth with extended nitrogen feeding

50 lb COVERS 9,500 sq ft

DIRECTIONS FOR USE: This LESCO product is a professional quality turf fertilizer for use on all lawn areas. The best results with this product are obtained when it is applied to actively growing grass, and watered into the turf soon after application. Avoid mowing immediately following application to prevent pick-up.

For best results, sweep or blow the fertilizer off walks and painted surfaces following application to avoid discoloration.

Recommended applications are at the rate of one pound of nitrogen and potash per 1,000 sq ft. Actual rates and timing of applications will vary with weather, soil and turf conditions.

For additional product assistance, call LESCO, Inc. in Strongsville, Ohio at 1-800-321-5325.

COVERAGE: 50 pounds of LESCO 19-0-19 Fertilizer covers approximately 9,500 sq ft at the application rate of one pound of nitrogen and potash (5.3 pounds of fertilizer) per 1,000 sq ft.

ROTARY SPREADER SETTINGS: Apply LESCO Fertilizers and Combination Products only with a rotary spreader. The following rotary spreader settings are approximate for the application rates of one pound of nitrogen and potash per 1,000 square feet. You may need to adjust the setting depending on walking speed, spreader condition and product.

ROTARY SPREADER		SETTINGS
LESCO	Calibration Gauge	#17
SCOTTS® R8A		K ½
Cyclone® or Spyker®		4½
LESCO Pendulum		32
Lely®		4¾ II

GUARANTEED ANALYSIS

TOTAL NITROGEN (N) 19.00%
19.00% Urea Nitrogen*

SOLUBLE POTASH (K_2O) 19.00%

SULFUR (S) Total 11.00%
4.20% Free Sulfur (S)
6.80% Combined Sulfur (S)

IRON (Fe) Total 2.00%
0.02% Water Soluble Iron

MANGANESE (Mn) Total 3.00%
0.43% Water Soluble Manganese (Mn)

DERIVED FROM: Polymer Coated Sulfur Coated Urea, Urea, Sulfate of Potash, Iron Sucrate, Manganese Sucrate.

CHLORINE (Cl) Max 2.00%

*12.80% Slowly Available Urea Nitrogen from Polymer Coated Sulfur Coated Urea.

F1406

WARRANTY

LESCO, Inc. warrants that this product conforms to the analysis on its label. When used in accordance with label directions, under normal conditions, this product is reasonably fit for its intended purposes. Since time, method of application, weather, plant and soil conditions, mixture with other chemicals, and other factors affecting the use of this product are beyond our control, no warranty is given concerning the use of this product contrary to label directions or under conditions which are abnormal or not reasonably foreseeable. The user assumes all risks of any such use.

Information concerning the raw materials composing this product can be obtained by writing to: LESCO, Inc., Attn: RA Dept, 15885 Sprague Rd., Strongsville, OH 44136-1772, referring to the item number found on this bag.

Information regarding the contents and levels of metals in this product is available on the Internet at http://www.regulatory-info-a1.com

G:\REGUL\WP\STRONGSV\Aprvd Lbl - Word\084097.doc Rev. 8/22/06 DB

NET WEIGHT 50 lb (22.7 kg)

Made in U.S.A. Distributed by LESCO, Inc. • 1301 East 9th Street • Cleveland, OH 44114-1849

#084097

Name	CAS #
Urea	57-13-6
Potassium Sulfate	7778-80-5
Iron Sucrate	8047-67-4
Manganese Complex	7439-96-5

(01)00758073804178

“What’s the difference between a poison and a cure?”

Where it IS needed, it would be environmentally irresponsible to NOT use P. Note the difference in turf establishment success from pre-plant P fertilization when needed as indicated by soil testing (left) vs. failure in establishment due to P deficiency (right) (photo courtesy of Dr. Tom Turner, University of Maryland).

A research team at Michigan State University led by Dr. Kevin Frank (above) investigated the efficiency of nitrogen use by mature Kentucky bluegrass when fertilized at a low (2 lb/1000 ft^2/year) and a high rate (5 lb/1000 ft^2/year). Results indicate that the high rate of nitrogen fertilization is much more than the turf needs and can result in unacceptable levels of nitrate-nitrogen in leachate.

USGA Turfgrass and Environmental Research Online 5(2):1-6.
TGIF Record Number: 108947

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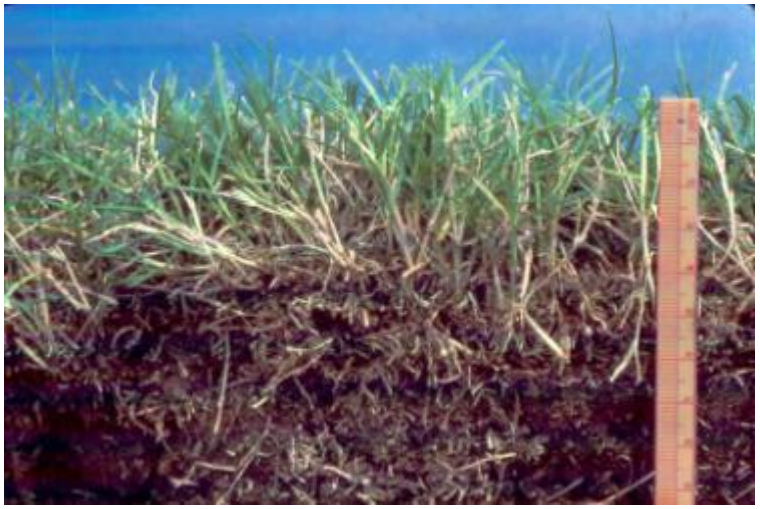
An obvious misapplication of a N source using a drop spreader. (This site had a 4% slope.)



Outside of newly constructed, modified sand-based soil systems and inappropriate application strategies, turfgrass systems are the "Las Vegas of The Landscape"… *what happens here, stays here*.

Dittmer (1938) reported that Kentucky bluegrass per cubic inch of soil had 2,000 roots, one million root hairs and a combined root length of over 4,000 feet.

“A Quantitative Study of the Subterranean Members of Three Field Grasses”

Dr. Howard J. Dittmer
American Journal of Botany
Vol. 25, No. 9 (Nov., 1938), pp. 654-657
(article consists of 4 pages)
Published by: Botanical Society of America

Lawn Debris on Hardscapes: Similar Concerns to Fertilizers

- *The major sources of phosphorus in runoff in storm sewers are from lawn clippings and tree leaves left in the streets and gutters. Other sources of phosphorus may come from soil particles either blown into the lakes by wind erosion or carried in runoff over bare soil.*

  FO-2903, Rosen and Horgan, Univ. of Minnesota Extension Service Publication.

Any “easy” solutions to improve water quality?

- One of the quickest and easiest ways to reduce nutrient movement into water sources is to establish low maintenance buffer zones. Why maintain turf all the way to the water’s edge? Florida defines this as the “Ring of Responsibility” in their educational materials.

Fertilizers and Water Quality – A healthy turf is actually a very beneficial component to the environment. It can provide soil stabilization and C sequestration. And the most practical way to keep our water resources clean is to ensure fertilizers and/or pesticides are applied to the turf canopy. Sweep or blow the fertilizer, pesticide, and/or clippings back into the turf.

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Commonwealth of Virginia

Virginia Nutrient Management Standards and Criteria

Revised October 2005

Department of Conservation and Recreation
Division of Soil and Water Conservation
203 Governor Street, Suite 206
Richmond, VA 23219-2094

(804) 786-2064

http://www.dcr.virginia.gov/documents/StandardsandCriteria.pdf

Freedom Lawns

- Based on a concept presented in Hannah Holmes' book 'Suburban Safari'
- The only input is periodic mowing
- This sounds very sustainable. Is it practical and practiceable in a typical mid-Atlantic homesite?

Freedom Lawns

- Research from the University of Minnesota (Bierman et al., 2010, Journal of Env. Quality).
- Kentucky bluegrass sod, silt loam soil, 5% slope, typical surface compaction caused by construction at a new home site, and no supplemental fertilizer in year one. In the second year, the following treatments were applied over years three through five:
- **No fertilizer**
- **Standard N (3 lbs/1000 ft^2/yr) + no P + standard potassium (K)**
- **Standard N (3 lbs/1000 ft^2/yr) + 1x P as recommended by soil test + standard K**
- **Standard N (3 lbs/1000 ft^2/yr) + 3x P as recommended by soil test + standard K**
- Fertilizer treatments were applied in 1/3 equal increments in May, September, and October of each year based on standard lawn fertilization guidelines from Minnesota Cooperative Extension. (These guidelines match those of Virginia Cooperative Extension closely.) No irrigation was used on these lawn plots. The initial soil test P level was 25 ppm; this level is in the sufficiency range, meaning little to no P was recommended by the Minnesota Soil Testing Lab for normal lawn maintenance.

Freedom Lawns

- What happened?
  - By the third year the no fertilizer plots had greatly reduced turf density, greater weed density, more exposed soil, and more dead grass/weed tissue than the N fertilized plots.
  - Adding P at a 1x- or 3x-recommended rate did not improve turf density relative to applying N-alone. Significantly, total P runoff from the no fertilizer plots was greatest over the three years of monitoring because of greater runoff depth. That is, more water was lost from the plots that did not receive N fertilizer because of insufficient turf cover to impede flow, especially when the soil surface was frozen.
  - Contained within this runoff water was also a greater load of P bound to soil and leaf litter sediment. Thus, as long as enough N was applied to maintain density and retard weed invasion, less P was lost in runoff, relative to the no fertilizer control, **even when** P was applied at 3 times the recommended rate.

What are Virginia Tech and Virginia Cooperative Extension faculty and staff doing in their research and outreach programs to enhance water quality within landscape management programs?

How might this construction site ultimately impact water quality?


Pre-plant incorporation of compost to a B-horizon soil (i.e. subsoil) at establishment.

http://connect.ag.vt.edu/compostforturf/

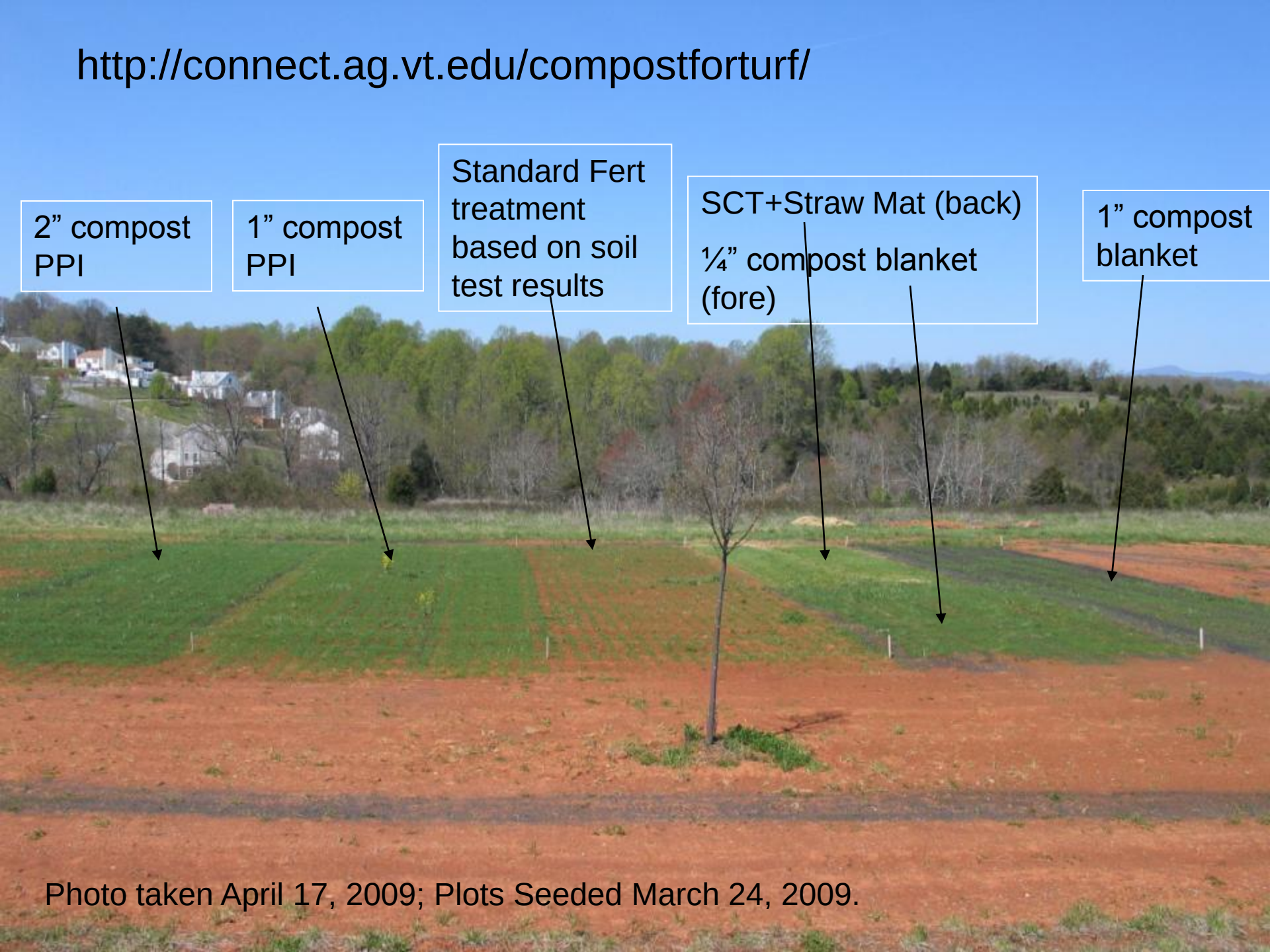
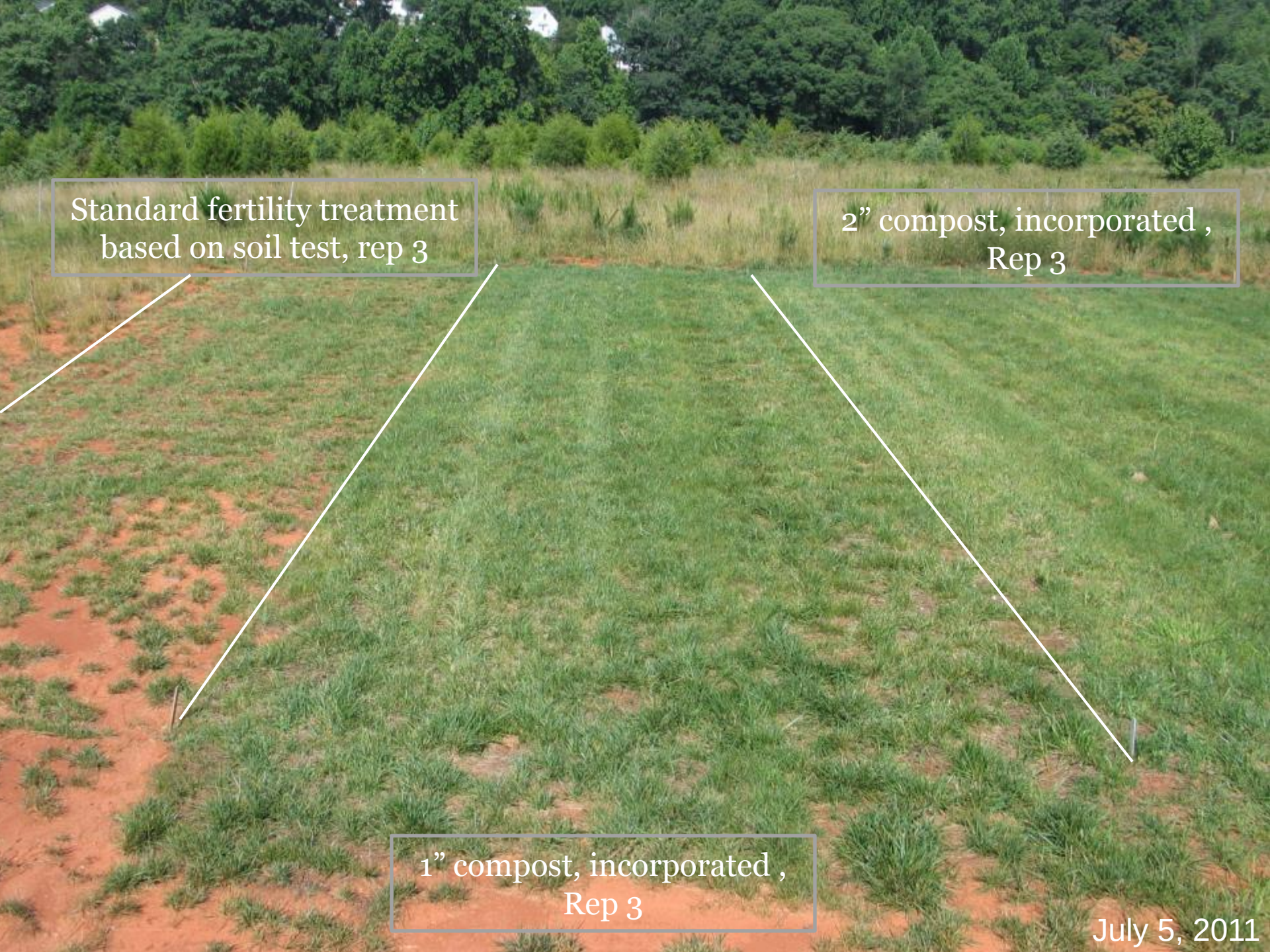
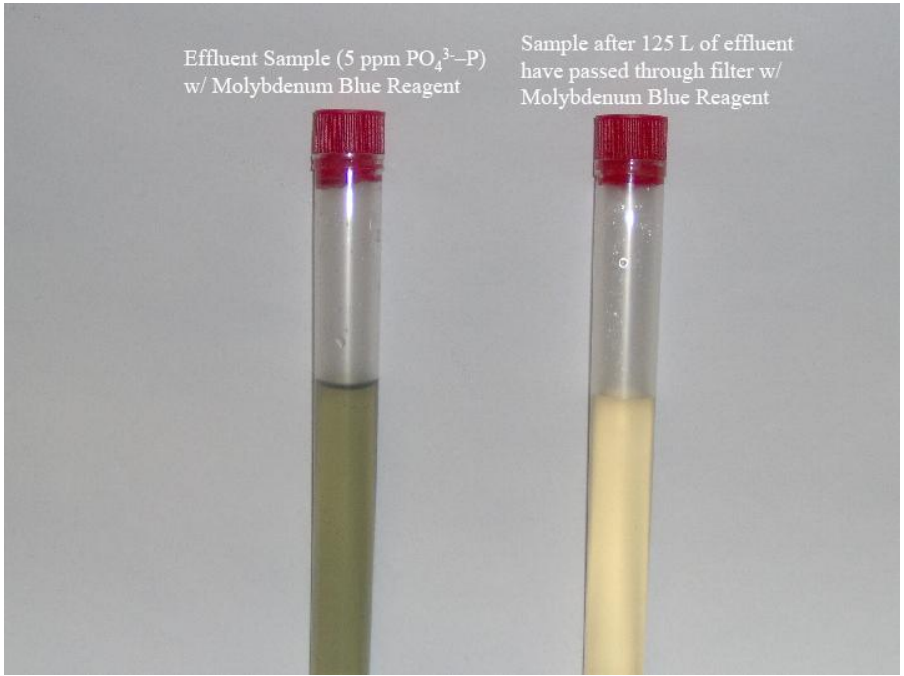


Photo taken April 17, 2009; Plots Seeded March 24, 2009.


Standard fertility treatment based on soil test, rep 3
2” compost, incorporated , Rep 3
1” compost, incorporated , Rep 3
July 5, 2011

A Rechargeable Filter for Nitrate and Phosphate Capture

- Components are an anion exchange resin and ferrihydrite coated glass beads.
- Filter is now capturing over 99.5% of phosphates and nitrates being passed.
- Challenges?
  - Developing a filter design so that drainage flow rate is not compromised.



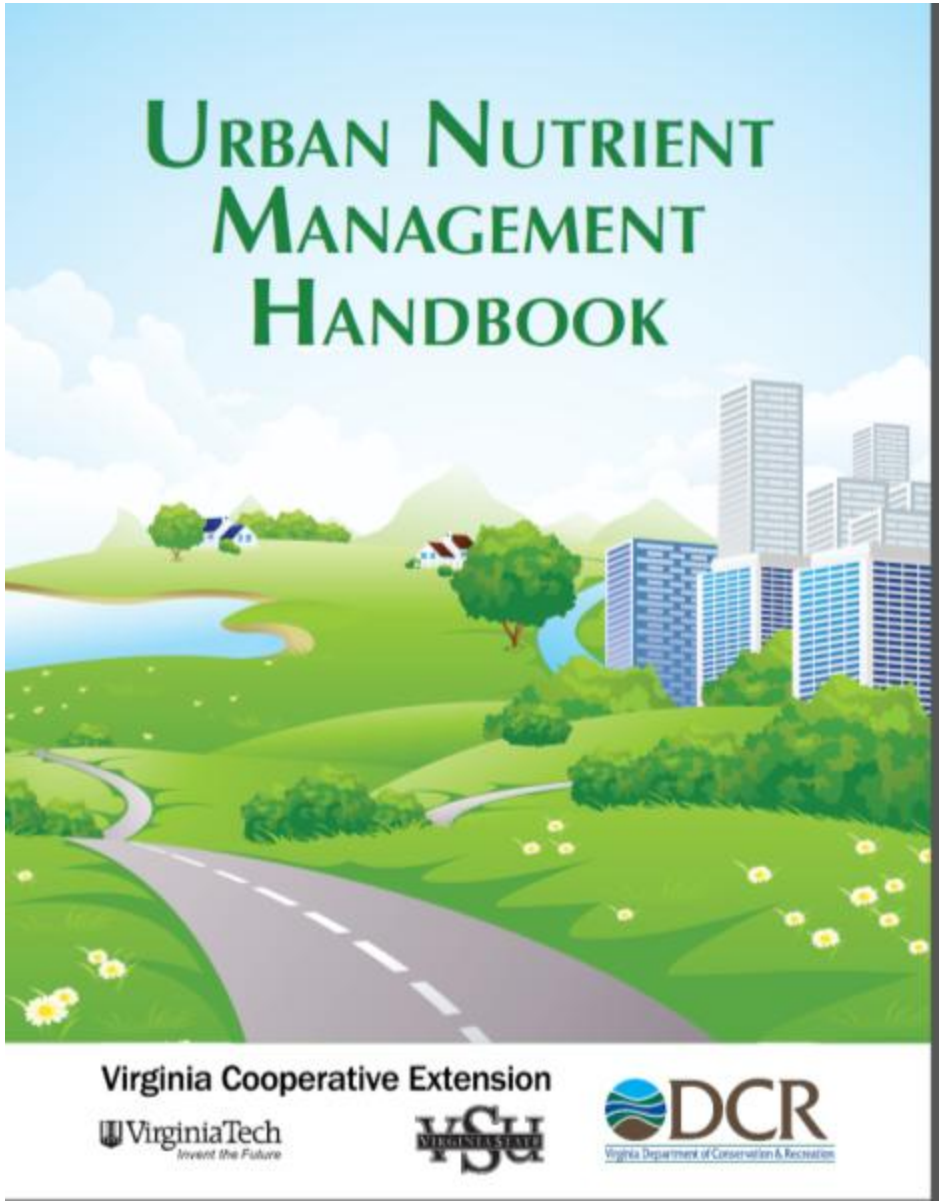
Research project of Adam Nichols, MS Candidate in CSES Dept.

Monitoring and filtering of leachate at Uva's Scott Field and Va Tech's Worsham Field.

VCE sponsored Master Gardener-led Urban Nutrient Management programs:

- “Home Turf”, Fairfax Co.
- “Grass Roots”, Loudoun Co.
- “Great Scapes”, Prince William Co.
- “Turf Love”, James City Co.
- “Smart Lawns”, Henrico Co.
- “Grass Roots”, Chesterfield Co.
- “Grass Gurus”, Norfolk
- And others…

The Virginia Department of Conservation and Recreation, Virginia Tech, and the Virginia Turfgrass Council partnered on the development of a first-ever Certified Turf and Landscape Nutrient Management Training Program that was launched in 2009.



http://pubs.ext.vt.edu/430/430-350/430-350_pdf.pdf

www.anr.ext.vt.edu/lawnandgarden/turfandgardentips/

Please let me know how I can help. Your suggestions are **always** welcomed.

Mike Goatley

goatley@vt.edu

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